{In Archive} Emerging EOR Practices in Oman: Targeting Riskier Plays to Offset Declining Production (WP Article)

Kevin Easley to: David Hogle, Theodore Rockwell, Ben Machol, Rob Lawrence, Richard Franklin 08/12/2008 12:02 PM

From: Kevin Easley/DC/USEPA/US

To: David Hogle/RA/R8/USEPA/US@EPA, Theodore Rockwell/R10/USEPA/US@EPA, Ben Machol/R9/USEPA/US@EPA, Rob Lawrence/R6/USEPA/US@EPA, Richard Franklin/R6/USEPA/US@EPA

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All,

I found the below article very interesting. Clearly, with the Oman O&G field profiled below, there is considerable risk (to human health and safety). I can't envision such a production field, with its inherent exposure risks, in the United States. Thoughts?

At first glance, it sounds entirely too risky to me given the potential for extensive human exposure to lethal concentrations of H2S (e.g., should the separation system malfunction, etc).

Best,

K

Thirst for Oil Feeds Innovation in Oman

Mindful of Its Dwindling Supplies, Nation Focuses on New & EOR Techniques to Offset Declining Production

By Ellen Knickmeyer
Washington Post Foreign Service
Tuesday, August 12, 2008; A06

HARWEEL OIL FIELDS, Oman -- **Sirens and air monitors surround the more-than-$1 billion oil installation rising off the flat, rock-strewn desert floor here in the 120-degree heat of Oman's interior.**

Construction crews, mostly Indians and Pakistanis in once bright-colored coveralls washed out by the sun, lay out escape routes and raise airtight shelters intended to save the lives of oil workers if the sirens ever go off.

Far underground, below a mile-thick layer of salt, lies the oil that Oman's state-controlled petroleum company is seeking. It sits in a cloud of pressurized gases laced with hydrogen sulfide (H2S) at concentrations that can kill in minutes.

In Saudi Arabia, Oman's neighbor, oil production still can be as easy as jamming pipe into the ground and pumping up the oil, or standing back to let it gush forth from the pressure of the reservoir.

But for Oman, "easy oil is over," said Khalid Jawad al-Khabouri, a gum-snapping

petroleum engineer at the headquarters of Oman's state oil company in Muscat, the capital.

At Harweel and several of the country's complex, aging fields, Oman is going after oil the hard way. More than any country along the Persian Gulf, Oman provides a preview of the future of oil.

A sultanate of fewer than 3 million citizens, Oman has staked much of its future on evolving production techniques known as enhanced oil recovery. Geologists and engineers here are employing many technologies also developing elsewhere in the Middle East, North America and China.

The country has invested $4 billion to $6 billion in current enhanced oil recovery projects, said Khalifa al-Hinai, technical adviser to Oman's Oil and Gas Ministry.

Most of the techniques involve pumping some agent -- steam and other gases, or chemicals including polymers and detergents -- into a reservoir to encourage oil to flow.

Petroleum Development Oman, a consortium that includes Oman's government along with Shell, Total and Partex oil companies, also is adopting in-situ combustion, which involves lighting fires within reservoirs to draw out the oil.

For Oman, the plunge into enhanced oil recovery is a necessity.

The world's other oil producers, even Saudi Arabia, will one day follow. With oil prices wedged above $100 a barrel this year, investors worldwide are sinking billions of dollars into enhanced oil recovery.

"The world has to," said Matt Simmons, an energy investment banker and a leading proponent of the argument that oil will run out sooner rather than later, in a telephone interview from the United States. "Because it's the last game going."

Even Oman has had to realize, however, that there's no single "magic undiscovered field or technology," cautioned Sadad Husseini, a veteran former petroleum geologist for Saudi Aramco.

Less flashy moves than enhanced recovery, such as recent decisions by Oman to open its oil fields to more competitors, are at least as smart, Husseini said.

With enhanced oil recovery, "It's just a case of people catching on to the buzzword that this is going to fix it, and we're going to get a whole lot of oil out of it," Husseini said. "And it doesn't quite do that."

Oman's state-controlled oil company started to see the end of easy oil in 2000, when daily production peaked at 840,000 barrels. Then production fell through one bottom after another, hitting 561,000 barrels a day in 2007.

By most accounts, Oman's sultan, Qaboos bin Said, had used much of the wealth of Oman's glory days of oil wisely.

He created generous public services and a modern, if pervasive, government -- police here routinely stop and issue fines to motorists on the road if their car needs washing, and inspectors scour Muscat for any building not painted the mandated white, cream or other light color.

Qaboos's father, Said Bin Taimour, provided fewer than 10 miles of paved road for all of Oman. He allowed Christian missionaries to run the nation's sole hospital.

Since bloodlessly deposing his father in 1970, Qaboos has put schools, clinics and roads within reach of all, thanks to Oman's oil. Air force helicopters shuttle children living in the country's mountains to boarding schools. Navy ships serve as school buses for some of the children living on Oman's islands.

But Qaboos was slow putting into practice plans to diversify Oman's economy. Even now, oil and gas account for nearly 80 percent of government revenue.

So when oil production started falling, Oman's government and oil officials started worrying.

"We as a company were in trouble," said John Malcolm, the managing director of Petroleum Development Oman.

"When you come to the edge of the cliff, you've got two choices," Malcolm said. "You can walk away from the edge, or you can fall off the edge."

"We think we're too young to fall off the edge," he said.

In 2003, the oil company assembled what would become scores of specialists and gathered up all the reports it could find about its fields. Experts searched for ways that old or undeveloped fields could be made productive.

Harweel, in southern Oman, is one of the results. The plant will pump gas into the reservoir, using the gas as a solvent to make oil flow to production wells. The hydrogen sulfide and other gases pumped up will be separated and treated, and some of it pumped back underground. Pipes with walls more than 3 inches thick will transport the hydrogen sulfide-laced gas.

The cost overall: "A Ferrari a meter," engineers at Harweel said.

Oil producers could expect to get 10 percent of Harweel's oil without enhanced oil recovery. With it, they hope for 30 percent. Without enhanced recovery, Oman could expect to run out of oil within 15 years. With it, said Hinai, the oil ministry adviser, Oman hopes for 40 years.

At company headquarters, Khabouri, the engineer, ran through the evolving recovery techniques.

Then he reached up and flicked an imaginary lever.

"After that," he said, " switch off the lights."

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Theodore Rockwell to: Kevin Easley 08/12/2008 12:48 PM
Cc: Ben Machol, David Hogle, Richard Franklin, Rob Lawrence

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It doesn't sound much different from fields on the North Slope, the temperatures are lower.....but the H2S is present and will kill if inhaled.
tlr

On assignment as part of the
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1June-26Sept. working in R8, Denver
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